

Original Research Report



Prevalence and Risk Factors of Sleep Debt among Adolescent Undergraduates at the University of Nigeria, Nsukka

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Abstract: Good quality sleep is essential for academic success and overall well-being, yet many adolescent students struggle to get enough of it. This study investigated the prevalence and risk factors associated with sleep debt among adolescents at the University of Nigeria, Nsukka. A descriptive cross-sectional research design was adopted. A multi-stage sampling procedure was employed to select a sample of 381 students from a population of 35,150. Five research questions guided the study. Data were collected using a validated structured questionnaire with a reliability coefficient of 0.90. Frequencies, percentages, means, standard deviation and chi-square were used for analysis. The findings showed that sleep debt was present in 67.0% of the adolescents. They reported unhealthy sleep habits, including inconsistent bedtimes and spending more than one hour on electronic devices after going to bed. At $p < 0.05$, the adolescents' sleep environment, smartphone usage patterns, sleep problems, and academic performance were significantly associated with the prevalence of sleep debt among them. Reported effects of sleep debt included abrupt awakenings, excessive yawning, headaches and migraines, decreased concentration, and feelings of confusion. To mitigate these problems, adolescents should establish a consistent sleep schedule, limit screen time, and seek help for any sleep disorders they may have. This study concludes that the high rate of sleep debt among this population may lead to many adverse physical and behavioural consequences. Therefore, the university was recommended to incorporate sleep education into students' orientation programs to help improve their sleep habits.

Keywords: Sleep deprivation, Adolescent undergraduate, Sleep environment, Electronic device use, Academic performance

1. Introduction

Sleep is a complex biological circadian cycle and a vital physiological function essential for human survival and health. It is characterized by altered consciousness, reduced physical and mental activity, and inhibited sensory responses, during which the brain remains active to reorganize and cleanse itself of toxic metabolic waste (Chinawa et al., 2014; Eugene & Masiak, 2015; National Institute of Neurological Disorders and Stroke [NINDS], 2023; Seun-fadipe & Mosaku, 2017a; Seun-fadipe & Mosaku, 2017b). Beyond providing physical rest, sleep enhances cognitive function through memory consolidation, faster problem-solving, and improved communication, concentration, and decision-making (Seun-fadipe & Mosaku, 2017a; Jiang, 2019). The restorative nature of adequate sleep is fundamental to neurological health and systemic functioning (Bazliel, 2020; NINDS, 2023), providing the cognitive foundation necessary for the learning and mental focus facilitated by the mind–body connection (Van Gordon et al., 2014). Without adequate restorative sleep, the body is unable to maintain these cognitive and physiological functions, resulting in the accumulation of sleep debt.

Sleep debt is the cumulative deficit of rest resulting from consistently sleeping fewer hours than the body requires (Elterman, 2024; Hale et al., 2018; Mutchler, 2024; Newsom, 2025). For example, a nightly four-hour shortfall results in a twenty-eight-hour deficit over one week. Sleep debt is often driven by irregular bedtimes, psychological distress, such as anxiety, and lifestyle factors, notably excessive screen time and internet addiction (Hale et al., 2018). While the internet offers significant educational benefits, its overuse frequently displaces necessary rest. The physiological and behavioural consequences of sleep deficit include extreme daytime tiredness, dark circles under the eyes, inattention, and emotional volatility characterised by irritability or aggression (Saghir et al., 2018; Suni & Dimitriu, 2023). This is particularly significant during adolescence, a period of significant

developmental changes, during which inadequate sleep makes it more difficult for young people to cope with the stress and worry of school (Bazliel, 2020). Adolescents are particularly vulnerable to sleep disturbances due to the influence of social interactions and technology on their development (Uccella et al., 2023).

Adolescence, defined by the World Health Organisation (2017) as the period between 10 and 19 years, is marked by rapid physiological, psychological, and cognitive changes that can significantly affect relationships, interpersonal interactions, and psychosocial functioning (Okechukwu et al., 2021). This is because the adolescent stage is characterised by emotional volatility, identity exploration, a desire for independence (Umennuihe et al., 2023), and behaviours such as sensation-seeking, risk-taking, parent-child conflict, and natural circadian phase-delay acquisition (Uccella et al., 2023). During adolescence, there is a shift in the body's internal clock, leading to delayed sleep onset and wake times, which often conflict with early school schedules and result in chronic sleep debt (Charoenthammanon & Gooley, 2025). Furthermore, misuse of technology and social pressures often reduce available sleep time, disrupting growth patterns and causing a cumulative sleep debt (Seun-fadipe & Mosaku, 2017b).

Social media use and unhealthy lifestyle patterns are significant contributors to irregular and insufficient sleep among adolescents (Seun-fadipe & Mosaku, 2017b). The widespread use of social media among university students demonstrates its profound impact on their daily lives (Umennuihe et al., 2024). Among university-aged adolescents, sleep deprivation commonly results from academic demands, expanded social opportunities, reduced parental oversight, late-night internet use, and other extracurricular activities (Oyewole et al., 2022; Seun-fadipe & Mosaku, 2017b), leading to later bedtimes, shorter and inconsistent sleep, and waking less refreshed. Studies (e.g. Abrams, 2015;

Chinawa et al., 2014; Liu et al., 2024; Ming et al., 2011; Seun-fadipe & Mosaku, 2017b) have shown that poor sleep impairs cognitive and motor performance and undermines psychological well-being, negatively affecting academic outcomes and increasing risks of burnout, substance use, exhaustion, and other health concerns. This study, therefore, examined the prevalence, associated factors, effects and solutions to sleep debt among adolescents in the University of Nigeria, Nsukka.

1.1. Statement of Problem

Sleep debt has become an increasingly pressing concern within the University of Nigeria, Nsukka (UNN), yet it remains largely overlooked, under-reported, and poorly understood. Unlike global discussions that generalise sleep problems across broad age groups, the realities at UNN reveal a more immediate and context-specific challenge. Many students live in overcrowded hostels, share limited facilities, and experience frequent disruptions that make it challenging to maintain healthy sleep routines. These environmental pressures are compounded by heavy academic workloads, early morning lectures, long study hours, and the competitive nature of university life. Behavioural factors, such as late-night screen use, social media engagement, and irregular sleep habits, serve as coping mechanisms for academic stress or social expectations, further intensifying the problem. Others take on part-time jobs to support their education, reducing the number of hours available for rest. For adolescents, whose cognitive, emotional, and physical development is still in progress, these combined pressures make them particularly vulnerable to accumulating sleep debt.

Despite these realities, sleep debt among UNN adolescents has received little systematic attention. Existing research rarely focuses on this age group or on the unique institutional conditions that shape their daily lives. As a result, there is a limited understanding of how environmental, behavioural, and academic factors interact to influence sleep patterns, or how sleep debt affects

students' well-being, learning capacity, and overall functioning. This gap highlights the need for a targeted investigation into the prevalence, drivers, and consequences of sleep debt among adolescent undergraduates at UNN, as well as potential strategies for addressing this issue.

1.2. Purpose of the Study

This research aims to determine the prevalence and associated factors of sleep debt among adolescents in the University of Nigeria, Nsukka. The specific objectives are to:

- (a) determine the prevalence of sleep debt among adolescents in the University of Nigeria, Nsukka;
- (b) assess the sleep habits of the adolescents;
- (c) determine the factors associated with sleep debt among adolescents;
- (d) ascertain the perceived effects of sleep debt among adolescents; and
- (e) ascertain the solutions to sleep debt among adolescents in the study area.

1.3. Research Questions

The following research questions guided the study:

- (a) What is the prevalence of sleep debt among adolescents at the University of Nigeria?
- (b) What are the sleep habits of the adolescents?
- (c) What are the factors associated with sleep debt among adolescents?
- (d) What are the perceived effects of sleep debt among adolescents?
- (e) What are the solutions to sleep debt among adolescents in the study area?

2. Materials and Methods

2.1. Design for the Study

The study design adopted a descriptive cross-sectional survey research design. This design was considered suitable for this study because data were collected from a sample of the study population

at a single point in time, and the relationship among the variables of interest was examined (Setia, 2016).

2.1.1. Ethics Statement

This research adhered to all ethical standards to ensure the integrity, safety, and welfare of participants. The study maintained maximum anonymity and confidentiality of the adolescents, and they were assured of their right to withdraw from the study at any time. Verbal and written informed consents were obtained from all the study participants, who understood the research's purpose, methods, potential risks, and benefits. The Research Ethics Committee of the University of Nigeria, Nsukka, approved this study.

2.2. Area of the Study

The study was conducted at the University of Nigeria, Nsukka, with 17 faculties and 102 academic departments. This study focused only on adolescent undergraduates, that is, students under 19 years of age.

2.3. Population and Sample

The population of this study was comprised of 35,130 undergraduate students (2022/2023 academic session) of the University of Nigeria (UNN), Nsukka Campus, according to information obtained from the academic planning unit of UNN (2023). The demographic data showed that 63.0% of the students were female, while 37.0% were male. Christianity (92.4%) was their primary religion. Cochran's formula for a finite population was used to calculate the sample size of 381 for the study. The study adopted a multi-stage sampling technique to determine the sample. Stage one involved using the stratified random sampling technique to divide the University of Nigeria, Nsukka campus, into ten strata, each representing one of the 10 faculties on campus. Stage two involved using simple random

sampling by balloting to select 40% (four) of the ten faculties, a method that ensured each faculty had an equal chance of selection, thereby reducing selection bias and supporting representative coverage of the broader student population. In Stage Three, proportionate sampling was used to determine the number of students to be selected from each faculty. In the final stage, a simple random technique without replacement was used to select the sample size computed for each faculty. Only the students who met the inclusion criteria were available during the data collection period and consented to participate in the study.

2.4. Inclusion and exclusion criteria

The study primarily included undergraduate students who were 19 years of age or younger to preserve a homogeneous sample of adolescents, as defined by the World Health Organisation (WHO) as the years between 10 and 19. This cut-off is important because, in contrast to older young adults, individuals in this developmental bracket undergo distinct adjustments in their circadian rhythms (delayed sleep phase) and neurobiological changes, particularly in the prefrontal cortex. By excluding students above the age of 19, the study isolates the unique physiological and social determinants of sleep debt related to the transition from adolescence to university life.

2.4. Instrument for Data Collection and Study Procedure

In this study, the instrument used for data collection was a questionnaire, the most reliable and relevant tool for gathering data in a survey investigation. The questionnaire consisted of five sections. Section A elicited data on the demographic characteristics of the respondents. Section B obtained information on the levels of sleep debt among adolescents. Section C obtained data on the sleep habits of the respondents. Section D addressed the perceived effects of sleep debt, and Section E gathered information from respondents on potential solutions to sleep debt. Responses were on a four-point

scale from strongly agree (4) to strongly disagree (1). The questionnaire items were developed in basic and unambiguous English to eliminate ambiguity and elicit direct responses from the respondents. The questionnaire was given to three lecturers from the Department of Home Science and Management at the University of Nigeria, Nsukka, for face and content validation to ensure that the instrument measures what it was designed to measure. Their corrections and inputs were considered when producing the final copy distributed to the respondents. The consistency of the instrument was measured using the Test-Retest method, and the Cronbach's alpha formula was used to obtain a reliability index of 0.90.

2.5. Data Collection Technique

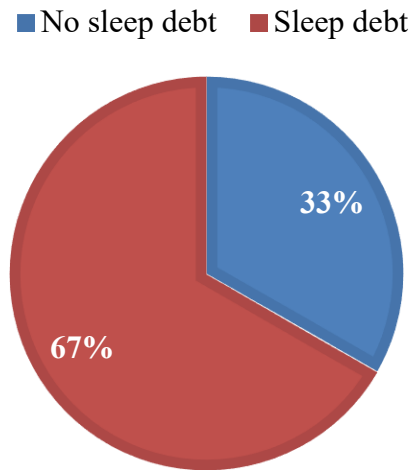
With the help of three trained research assistants who were postgraduate students, the questionnaires were distributed to the respondents in the lecture halls. The completion time was 10-15 minutes, after which the questionnaires were retrieved. Four hundred questionnaires were distributed, but 381 were retained for data analysis due to incomplete information. This gave a 95% return rate.

2.6. Data Analysis Technique

The data obtained was coded into IBM SPSS version 27.0. Frequencies, percentages, mean, and standard deviation were used for descriptive analysis, while Chi-square was used to test relationships between categorical variables at a $p < 0.05$ significance level. Following the criterion mean approach (Uzoagulu, 2011), the decision cut-off point was set at 2.50, calculated as the arithmetic mean of the 4-point scale weights used for the research instrument. Consequently, item means ≥ 2.50 were accepted as agreed, while means < 2.50 were regarded as disagreed.

3. Results and Discussion

Figure 1: Prevalence of sleep debt among adolescent undergraduates



3.1. Prevalence of sleep debt

Figure 1 shows that sleep debt was present in a greater percentage (67.0%) of the adolescents, while sleep debt was absent in 33.0%.

Sleep debt, also known as sleep deficit, refers to the cumulative difference between the amount of sleep an individual needs and the amount they actually get (Felson, 2023). The 67% prevalence of sleep debt among adolescents in this study suggests that most adolescents in UNN get insufficient sleep relative to their requirement, which is 8-10hours, according to the American Academy of Sleep Medicine [AASM] (2016). Meeting the stipulated hours is crucial for promoting optimal health and daytime alertness during the critical transition from childhood to adulthood. Our finding of a 67% prevalence rate corroborates with studies (e.g., Oyewole et al., 2022; Seun-Fadipe & Mosaku, 2017a; Seun-Fadipe & Mosaku, 2017b), which found prevalence rates of 35.8%, 49.5%, and 50.1% of poor sleep among university students in the southwestern part of Nigeria. This is equivalent to a sleep debt of more than 5 hours per night, indicating that a significant percentage of undergraduate students are sleep-deprived. Compared with other segments of society, undergraduates are more vulnerable to sleep

debt due to their unique challenges, including irregular class schedules, academic pressures, and increased screen time (Seun-Fadipe & Mosaku, 2017a).

Table 1: Sleep habits of the adolescents

Variables	Frequency	Percentage
Sleep latency		
Less than 30 minutes	179	47.0
30 minutes to 1 hour	146	38.3
More than 1 hour	56	14.7
Number of sleep-wake cycles		
One	165	43.3
Two	113	29.7
More than two	103	27.0
Having a specific bedtime		
Yes	107	28.1
No	274	71.9
Use of electronic devices during bedtime		
Less than 30 minutes	117	30.7
30 minutes to 1 hour	108	28.3
More than 1 hour	126	33.1
No use of electronic gadgets after lying down to sleep	30	7.9
Sleep problems		
Presence of sleep problems (insomnia, snoring, sleepwalking, and sleep-talking)	225	59.1
No sleep problems	156	40.9

3.2. Sleep habits of adolescents

Table 1 presents the frequency and percentage of responses to the adolescent's sleep habits. It takes less than 30 minutes for 47.0% of the students to fall asleep after lying down. A greater proportion

(43.3%) of the students have one sleep-wake cycle, while 27.0% wake up more than twice during the night. The majority (71.9%) of the respondents do not have specific bedtimes, while 28.1% have specific bedtimes. More than a third (33.1%) of the students had screen time of more than 1 hour after lying down to sleep. More than half (59.1%) of the adolescents experienced sleep problems, such as snoring, sleepwalking, and talking in their sleep, while 40.9% did not. Page | 11

Maintaining a healthy sleep habit is important for adolescents' health and well-being. This study revealed that the adolescents had poor sleep habits, including inconsistent bedtimes, prolonged phone use after lying down, a long sleep latency period, multiple sleep-wake cycles, and sleep disturbances such as snoring and sleepwalking. This finding aligns with Dowdell and Clayton (2019), who reported that over 70% of students engaged in sleep texting and had lower sleep quality ratings than non-sleep texting students. In the study by Johansson et al. (2017), 97% of young people used technology before going to sleep and were frequently awakened by their cell phones at night. Sleep debt has been linked to difficulty falling asleep, frequent nighttime awakenings, or early morning wake-up times. Exposure to device lighting before bed, even for just an hour or two, also delays the release of melatonin (Wood et al., 2013), a hormone that plays a crucial role in regulating the sleep-wake cycle and circadian rhythm. Our findings on sleep problems experienced by adolescents align with those of Chinawa et al. (2014), who reported unusual sleep behaviours, such as walking, talking, or experiencing night terrors, among university students.

Table 2: Factors associated with the prevalence of sleep debt

Variables	Absence of sleep debt F (%)	Presence of sleep debt F (%)	Total F (%)	Statistics
Gender				
Male	42 (29.8)	99 (70.2)	141 (100.0)	$\chi^2 = 1.267$, df = 1, p = 0.260
Female	85 (35.4)	155 (64.6)	240 (100.0)	
Sleep environment				
Comfortable	65 (38.7)	103 (61.3)	168 (100.0)	$\chi^2 = 3.881$, df = 1, p = 0.049*
Uncomfortable	62 (29.1)	151 (70.9)	213 (100.0)	
Smartphone usage pattern				
Low use	16 (29.6)	38 (70.4)	54 (100.0)	$\chi^2 = 8.303$, df = 2, p = 0.016*
Moderate use	76 (40.2)	113 (59.8)	189 (100.0)	
Excessive use	35 (25.4)	103 (74.6)	138 (100.0)	
Sleep problems				
No sleep problems	49 (31.4)	107 (68.6)	156 (100.0)	$\chi^2 = 10.67$, df = 2, p = 0.005*
Mild to moderate sleep problems	30 (51.7)	28 (48.3)	58 (100.0)	
Severe sleep problems	48 (28.7)	119 (71.3)	167 (100.0)	
Workforce engagement				
Not engaged	56 (33.3)	112 (66.7)	168 (100.0)	$\chi^2 = 0.000$, df = 1, p = 1.000
Engaged	71 (33.3)	142 (66.7)	213 (100.0)	
Academic performance				
Low performance	11 (12.5)	77 (87.5)	88 (100.0)	$\chi^2 = 39.405$, df = 2, p = <0.001*
Average performance	30 (25.6)	87 (74.4)	117 (100.0)	
High performance	86 (48.9)	90 (51.1)	176 (100.0)	

χ^2 = Chi-square value; p = Level of significance; df = degree of freedom; * = statistically significant (p<0.05)

3.3. Factors associated with sleep debt

Table 2 presents the chi-square analysis of the factors associated with the prevalence of sleep debt

among undergraduate adolescents at UNN. Preliminary checks confirmed that the assumptions for the Chi-square test were met. All cells had expected frequencies above five; no cell had a frequency below one, and independence of observations was maintained since each participant appeared in only one category. Therefore, the Pearson Chi-square results ($p < 0.05$) are valid for assessing the associations between sleep debt and the investigated factors. From the table, the adolescents' sleep environment, smartphone usage pattern, sleep problems and academic performance were significantly associated with the prevalence of sleep debt among them. On the other hand, the respondents' gender and workforce engagement were not significantly associated with the prevalence of sleep debt. However, sleep debt was recorded more in male adolescents (70.2%) compared to their female counterparts.

Sleep debt, characterised by insufficient sleep that accumulates over time, is influenced by various factors. This study shows that adolescents' sleep environment, smartphone usage patterns, sleep problems, and academic performance were significantly associated with the prevalence of sleep debt. The implication is that sleep debt increases when adolescents have an uncomfortable sleep environment, use their electronic media excessively, and experience sleep problems and poor academic performance. Supporting this finding, a study by Seun-fadipe and Mosaku (2017) found that university students who failed one or more courses had poorer sleep quality than those who passed all their courses. Similarly, Chinawa et al. (2014) concluded that students in their study area have varying degrees of sleeping practice, which may affect their academic performance. Findings of this study also showed that the respondents' gender and workforce engagement were not significantly associated with the prevalence of sleep debt. This result aligns with that of Oyewole et al. (2022) and Seun-fadipe and Mosaku (2017b), which showed that student engagement in part-time jobs was not significantly associated with their sleep quality. In contrast, Seun-fadipe and Mosaku (2017a) found a significant

relationship between sleep deprivation and student workforce engagement, with students who engaged in part-time jobs having poorer sleep quality compared to those who did not. Our finding, which showed that sleep debt was recorded more frequently in male adolescents than in their female counterparts, is similar to that of Seun-fadipe and Mosaku (2017a), who found that female students had better sleep quality compared to their male counterparts. Furthermore, Gaultney (2010) highlighted the impact of electronic media use on sleep patterns among undergraduates. The findings of this study also corroborate those of Kelley et al. (2015), who demonstrated that irregular sleep patterns, such as staying up late and inconsistent bedtimes, are associated with increased sleep debt. Research by Lund et al. (2010) also found that irregular sleep schedules, including all-nighters and erratic sleep-wake times, contribute significantly to sleep debt among college adolescents.

Table 3: Perceived effects of sleep debt

Effects	Mean	Standard deviation	Decision
Physical effects			
Weight gain	1.97	0.82	Disagree
Higher risk of injury	2.69	0.81	Agree
Engagement in more injury-prone behaviour	2.60	0.71	Agree
Sleep episodes that last less than 30 seconds	3.02	0.67	Agree
Abrupt awakenings and excessive yawning	3.25	0.64	Agree
Headaches and migraines	3.48	0.63	Agree
Interference with the healthy functioning of the immune system	3.12	0.75	Agree
Behavioural effects			
Feeling impatient, irritable and prone to mood swings	3.12	0.74	Agree
Decreased concentration and difficulty focusing on tasks	3.30	0.66	Agree
Confusion and difficulty reasoning logically	3.12	0.74	Agree
Difficulty in controlling one's actions	2.84	0.87	Agree

Insufficient sleep could affect one's ability to control their emotions	2.88	0.83	Agree	Page 15
Increased hunger and higher calorie intake	2.88	0.80	Agree	
Poor sleep directly impacts mental function and memory, which in turn affects various aspects of school performance	3.20	0.69	Agree	

3.4. Perceived effects of sleep debt

The mean and standard deviation responses on the perceived effects of sleep debt are shown in Table 3. Some of the physical effects include a higher risk of injury and injury-prone behaviour (2.69), short sleep episodes (3.02), abrupt awakenings and excessive yawning (3.25), headaches and migraines (3.48), and interference with the immune system (3.12). Behavioural effects of sleep debt include impatience (3.12), irritability and mood swings (3.12), decreased concentration and difficulty focusing on tasks (3.30), difficulty reasoning logically (3.12), difficulty controlling personal actions (2.84) and reduced ability to control emotions (2.88).

Lack of sleep directly affects how people think and feel; just a night of insufficient sleep has effects like daytime drowsiness, lack of vigour, and an irritable mood. While a lack of sleep may cause apparent physical and mental exhaustion in the short term, ongoing sleep deprivation can increase the risk of more serious physical and mental health problems over time (Sun & Dimitriu, 2023). The study's findings show that sleep debt has many physical and health impacts on adolescents. This suggests that not getting enough sleep predisposes adolescents to a higher risk of injury, headaches, migraines, immune system interference, and reduced ability to control their emotions. When students fail to obtain the required hours of sleep, they tend to experience short sleep episodes, abrupt awakenings, excessive yawning, decreased concentration, difficulty focusing on tasks and difficulty reasoning logically. They may also exhibit impatience, irritability, mood swings, and difficulty

controlling their actions. This is supported by Tewari et al. (2011), who reported that sleep deprivation leads to neurobehavioral deficits and an adverse physiological state, amongst other detrimental effects.

A study by Yaghmour (2023) also showed that sleep debt has tremendous psychological effects on university students. The relationship between sleep and inflammation, as discussed by Irwin (2015), highlights the two-way influence between sleep disturbances and the immune system. Sleep disruptions can lead to dysregulated inflammatory and antiviral responses, weakening the immune system. Inadequate sleep disrupts essential biological processes, significantly increasing the risk of chronic conditions such as obesity, diabetes, and cardiovascular disease, with short-sleepers (less than 6 hours each night) facing a 50% higher risk of heart-related mortality, while also elevating the likelihood of premature death (12.5% higher risk) and behavioral impulsivity (Chattu et al., 2018; Demos et al., 2016; Lee, 2018). These highlight the importance of improving sleep quality in children and adolescents.

Table 4: Possible solutions to sleep debt

Solutions	Mean	Standard deviation	Decision
Establishing a consistent sleep schedule	3.30	0.61	Agree
It is important to take naps in order to improve sleep time	3.30	0.59	Agree
Reducing screen time, especially during bedtime and late at night	3.34	0.61	Agree
Engaging more in physical activities could improve sleep	3.29	0.62	Agree
Reducing the intake of caffeine or stimulants	3.43	0.56	Agree
Creating a comfortable sleep environment	3.52	0.54	Agree
Avoiding heavy meals before bed	3.37	0.67	Agree
Seeking professional help in the case of a sleep disorder	3.41	0.58	Agree
Prioritizing sleep	3.32	0.61	Agree

3.5. Perceived solutions to sleep debt

Table 4 presents the mean and standard deviation of responses to the possible solutions for sleep

debt. The students agree with the following solutions: establishing a consistent sleep schedule (3.30), taking naps in order to improve sleep time (3.30), reducing screen time (3.34), engaging in physical activities (3.29), reducing the intake of caffeine (3.43), comfortable sleep environment (3.52), avoiding heavy meals before bed (3.37), seeking professional help (3.41) and prioritizing sleep (3.32). Page | 17

Many people attempt to manage sleepiness with strategies such as taking sleeping medication and napping, which may provide temporary relief but are not sustainable long-term solutions. It is therefore essential to focus on increasing both the quantity and quality of sleep (Krishnaswamy et al., 2016). The result of this study suggests that sleep debt can be mitigated by establishing a consistent sleep schedule, taking naps at the right time, reducing screen time especially during bed time and late at night, engaging more in physical activities, reducing the intake of caffeine or stimulant, creating a comfortable sleep environment, avoiding heavy meals before bed and seeking professional help especially in the case of sleep disorder. Similarly, the study by Zerón-Rugério et al. (2022) suggests that dietary choices can significantly impact sleep quality and circadian rhythms. Hirshkowitz et al. (2015) further emphasised the importance of maintaining consistent sleep schedules for achieving optimal health outcomes.

3.6. Policy Implications

The findings of this study suggest that the high prevalence of sleep debt among adolescent undergraduates is strongly associated with uncomfortable sleep environments and sleep-related problems. This underscores the need for institutional-level interventions that go beyond individual behaviour change and address the broader structural conditions shaping students' sleep.

1. At the university level, administrators should prioritise improvements in student accommodation policies, ensuring that hostels are safe, well-ventilated, and not overcrowded.

Enhancing lighting, noise control, and bed quality would create a more conducive sleep environment. Regular inspections and maintenance schedules could further support healthy living conditions.

2. In addition, the university should strengthen its medical and counselling services, making them more accessible to students experiencing sleep problems, stress, or mental-health-related concerns. Embedding sleep-health education within orientation programmes, general studies courses, or wellness seminars would help students understand the importance of healthy sleep practices early in their academic journey.
3. Institutional support could also include integrating sleep-hygiene training into campus-wide health promotion initiatives, offering workshops on managing screen time, establishing consistent sleep routines, and balancing academic demands. Collaboration between academic departments and student affairs units could help reduce excessive workload clustering and promote more balanced academic scheduling.

3.7. Limitations and Suggestions for Further Research

One major limitation of this study is the potential for response bias, where participants may have inaccurately reported their actual sleep time. There is also the problem of generalisation to other tertiary institutions in Enugu State, as this study used only one University. We therefore suggest that further research be conducted in other universities to raise awareness and provide national data on sleep debt. To overcome researcher bias, an experimental study using sleep monitoring devices could be conducted to detect the adolescent's actual sleep time. Conducting a longitudinal study will also present the long-term effects of sleep deprivation.

4. Conclusion

This study determined the prevalence, associated factors, and effects of sleep debt among adolescent undergraduates at UNN. A high prevalence of sleep debt was recorded in this study, with most adolescents having poor sleep habits. Findings of this study suggest that sleep debt increases when adolescents have an uncomfortable sleep environment, use their electronic media excessively, and experience sleep problems and poor academic performance. This study identified the behavioural and physical effects of insufficient sleep on adolescents. It provided solutions such as establishing a consistent sleep schedule, reducing screen time, avoiding heavy meals before bed and seeking professional help. University administration must therefore incorporate sleep education, campaigns, and workshops into students' orientation programs to help improve their sleep habits. The school should provide resources and guidance on time management to aid students in balancing school and personal activities, and prioritise sleep for improved academic performance and overall wellness.

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Conflict of Interest

The authors declare no conflict of interest among them.

Author Contributions

Conceptualisation: CLU, CCI

Formal Analysis: CLU, FOO, CCI

Funding Acquisition: CLU, FOO, CCI

Investigation: CLU, CCI

Methodology: CLU, CCI

Writing original draft, review and editing: CLU, FOO

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Data Availability Statement

Request for the raw data for this study should be directed to the authors through the corresponding author. The authors are ready to address any reasonable request.

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